



Supplementary
Environmental & Social
Impact Assessment
(ESIA) for Almaty
Railroad Bypass Project,
Kazakhstan

Non Technical Summary

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Non Technical Summary

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1. EXECUTIVE SUMMARY

1.1 INTRODUCTION

The Kazakhstan Temir Zholy Joint Stock Company (the “Developer” or “KTZ”) is developing the Almaty Railroad Bypass (the “Project”), as part of the Trans-Caspian International Transport Route. The Project aims to resolve the current railway overload and logistics bottleneck around the city of Almaty. The Project consists of the construction of a 75km railway alignment between Kazybek Bek and Zhetygen; including railway stations, power infrastructure, civil structures and ancillary facilities. Under the appointed Engineering Procurement and Construction (EPC) Contractor, Integra Construction KZ LLP (“Integra”), land preparation and construction of the Project began in November 2023 and is expected to be completed in 2025.

The Asian Infrastructure Investment Bank (“AIIB”) and the International Finance Corporation (“IFC”), collectively known as the “Lenders”, are considering financing the construction and operation of the Project. ERM was contracted by the Lenders in Q3 2024 to conduct a Supplementary Environmental and Social Impact Assessment (“Supplementary ESIA”) (inclusive of a Livelihood Restoration Plan and Resettlement Framework) against the Lender’s applicable standards and provide additional information to the local Environmental Impact Assessment (“National EIA”). The Supplementary ESIA aims to address the Environmental, Social and Biodiversity gaps between the National EIA and the IFC Performance Standards (PS) and Good International Industry Practice (GIIP).

1.2 APPLICABLE REFERENCE FRAMEWORK

The Supplementary ESIA has been undertaken with reference to the requirements and standards of relevant local regulations, international conventions and international standards including:

- The Republic of Kazakhstan (RoK) legislation, policies, standards including environmental, social, health and safety laws applicable to the Project.
- International Conventions ratified by RoK including ILO Core Conventions, United Nations Convention on Biological Diversity (1992) and Coherence with Sustainable Developmental Goals and the Paris Climate Agreement.
- The IFC Performance Standards (2012), World Bank Group (WBG) Environmental Health and Safety (EHS) Guidelines for Railways (2007), WBG EHS Guidelines for Electric Power Transmission and Distribution (2007), WBG EHS Guidelines for Construction Materials Extraction.
- Topic-specific international standards including Transit Noise and Vibration Impact Assessment Manual (Report 0123) by United States Federal Transit Administration (USFTA), British Standard BS 5228: Noise and Vibration Control on Construction and Open Sites, GHG Protocol Corporate Account and Reporting Standard.

1.3 PROJECT BACKGROUND

The Trans-Caspian International Transport Route, also known as the Middle Corridor, connects East Asia to Europe via Central Asia and the Caspian Sea. The Middle Corridor is an alternative transport route to the Northern Corridor Route (which cuts through Russia) and the marine shipping route that goes through the Suez Canal. The Middle Corridor saw an increase of 88%

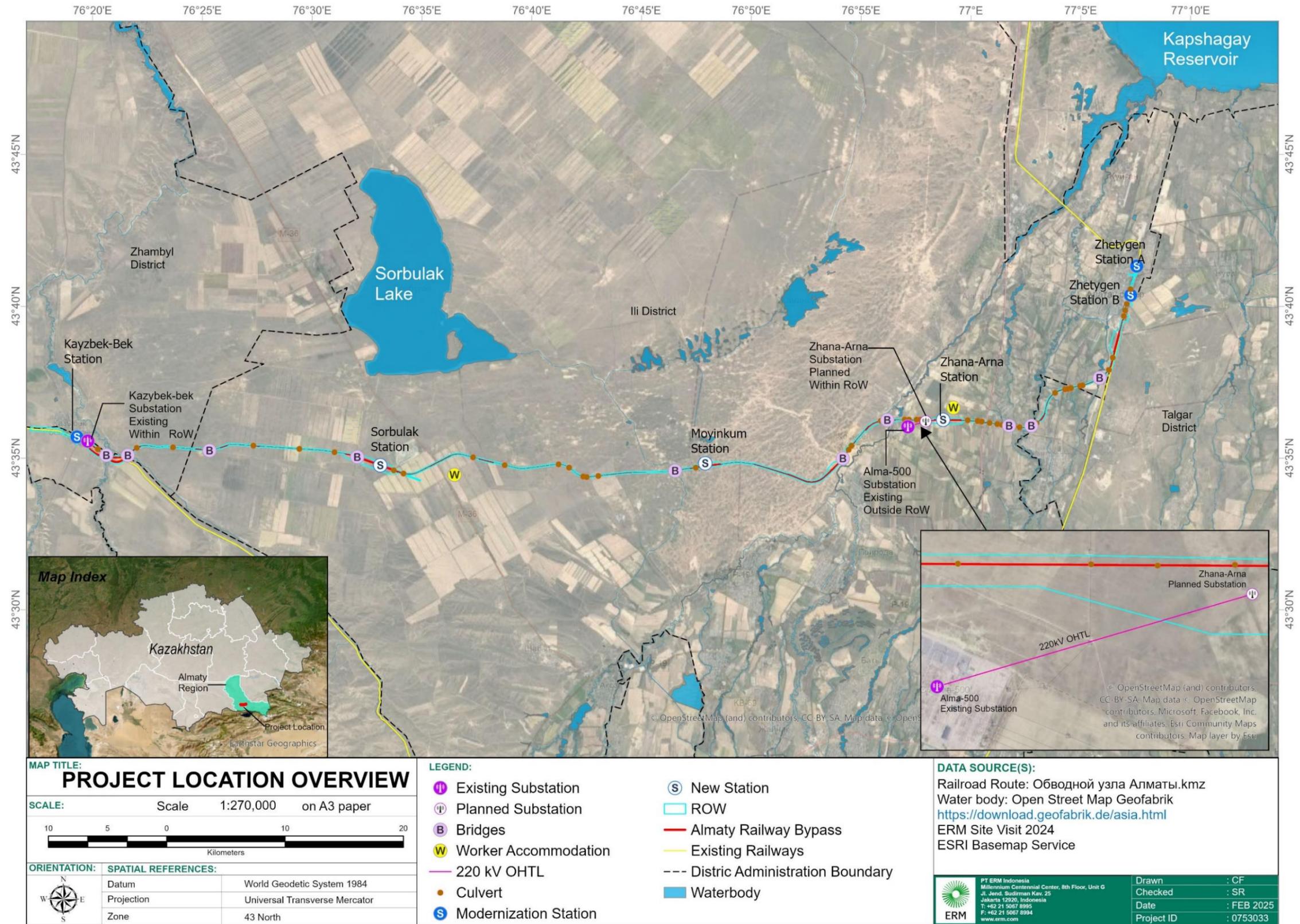
in cargo transport volume of up to 2 million tons in the first nine (9) months of 2023, which may be subjected to further increase in the future. To enhance the capacity of the Middle Corridor, KTZ is developing a 75km railway bypass as part of the Altyn-Khorgos border crossing railway route. The 75km alignment will connect to the Almaty-1-Chu Railway line at Kazybek Bek Station and to the Almaty-1-Aktogay line at the Zhetygen Station. The railway bypass helps provide another pathway for the freight trains, offering an alternative route to bypass the congested Almaty city for the transport of cargo. The Project enhances the total capacity of the Middle Corridor by up to 10 million tons by 2030.

The railway bypass will also act as a crossway junction and to facilitate further transit towards four stations: Shu, Aktogay, Altynkol, and Almaty-2. This improves the connectivity within the region and provides transportation to surrounding countries such as China, Siberia, Kyrgyzstan and Uzbekistan.

1.4 PROJECT LOCATION

The Project is located in the Almaty region of Kazakhstan, approximately 60km north of the Almaty city centre (**Figure 1-1**). The Project crosses five districts in the Almaty region, namely Karasay, Zhambyl, Ilyisky, Talgar, and Alatau City, spanning 75km from Kazybek Bek (west) to Zhetygen (east). Prior to the commencement of construction, the primary land use along the alignment was largely barren land interspersed with clusters of agricultural land, grazing land and land leased to support livestock rearing and commercial farming. The population of the Project Area is mainly rural, with the exception of the city of Alatau and Talgar town.

FIGURE 1-1: PROJECT LOCATION OVERVIEW



1.5 PROJECT FACILITIES AND COMPONENTS

The major facilities and components of the Project are summarised subsequently and are located within the Project Right-of-Way (RoW)¹, unless stated otherwise:

- A total of 130 km of railway track (note the Bypass spans 75km across Kazybek Bek and Zhetygen with double tracks across certain segments of the bypass, the remaining 55km serves as maintenance tracks / branch lines / interchange lines etc).
- The development of five (5) railway stations, including the modernisation of two (2) existing stations² – Kazybek Bek Station and Zhetygen Station and the construction of three (3) new stations – Sorbulak Station, Moyinkum station, and Zhana Arna Station. The development also includes new depots, maintenance and servicing facilities, employee accommodations, and supporting infrastructure.
- Power Infrastructure, including:
 - Three (3) 500/220kV substations and overhead transmission line (OHTL)
 - One (1) existing substation at Kazybek Bek
 - One (1) new substation to be constructed within the station footprint of Zhana Arna to provide power for the electrified rail line
 - 1.9km 220 kV OHTL to connect the new substation to the national grid at the existing PS-Alma-500 substation. About 500m of the OHTL lies within the Project RoW.
 - One (1) single circuit 10 kV underground power transmission line spanning 73km and runs parallel to the alignment within the Project RoW
 - One fibre optic cable (VOK-24)
 - Three (3) switches
- Civil structures, including:
 - Thirteen bridges
 - Five (5) railway overpasses
 - One (1) road crossing
 - 59 Culverts
 - Eleven (11) level crossings
 - Six (6) cattle crossings
- Construction worksites for the above works (including access roads, laydown areas, concrete batching plants)
- Diversion of existing utilities³
- Two (2) construction labour accommodation camps for the construction workforce that are located at Sorbulak Station and Zhana Arna Station⁴.

¹ Also known as 'wayleave' or 'easement' in some countries but referred to as RoW in this Supplementary ESIA. The RoW is 300m wide (150m on either side on the line). The RoW for certain sections may be wider.

² While the Project is designed for freight operations, Zhetygen and Kazybek Bek are existing railway stations. Zhetygen station currently serves both passenger and freight traffic, whereas Kazybek Bek is primarily a freight station.

³ This includes existing intersecting transmission lines and underground pipelines.

⁴ As of 17 January 2025, KTZ and Integra have informed that there are no existing labour accommodation camps as the project is in the late stages of construction.

- 14 quarries of which total area is estimated at 181 hectares. Out of these 14 quarries, 10 are outside the RoW and four (4) intersect with the RoW with small portions amounting to approximately six (6) hectares which are within the Project RoW.

1.6 PROJECT ACTIVITIES

1.6.1 PRE-CONSTRUCTION PHASE

Land acquisition for the Project commenced in May 2023 and is expected to be completed by early to mid-2025. The Project footprint is determined by:

- the land requirements for the Project and
- RoW provisions in accordance with national regulations, depending on the specific project components.

In summary, the Project requires:

- **Permanent land acquisition** of 284 land plots covering an estimated area of 1056 hectares. Of this, 167 land plots amounting to 728 hectares are privately-owned while the remaining are state land.
- **Permanent land acquisition** of 17 to 19 land parcels measuring about 1 meter by 1 meter for the construction of a 1.9km 220kV overhead transmission line⁵ (OHTL) connecting the Zhana Arna substation to existing PS-Alma-500 substation⁶.
- **Temporary land acquisition** of 181 ha across 14 quarries during the construction phase. Of the 14 quarries, four (4) intersect with the RoW while the remaining are located outside the RoW.

TABLE 1-1: LAND REQUIREMENTS PER DISTRICT (PERMANENT)

Affected Plots Per District	Total	Privately owned	State-Owned Land under Lease	Existing KTZ-owned land	Other State-Owned land
Iliy					
No. of Affected Plots	140	75	32	13	20
Affected area (Hectares)	850.51	586.65	239.3	17.72	6.84
Karasay					
No. of Affected Plots	13	4	2	5	2
Affected area (Hectares)	39.55	14.98	14.33	10.24	0
Talgar					
No. of Affected Plots	48	41	5	0	2
Affected area (Hectares)	38.96	34.97	3.4	0	0.59
Zhambyl					
No. of Affected Plots	34	7	4	20	3

⁵ Approximately 500m of the 1.9km stretch overlaps with the Project’s RoW.

⁶ The land requirements for the 220kV OHTL connecting Zhana Arna to PS-Alma 500 is yet to be finalised, and land procurement for the OHTL has not yet begun as of January 2025.

Affected Plots Per District	Total	Privately owned	State-Owned Land under Lease	Existing KTZ-owned land	Other State-Owned land
Affected area (Hectares)	43.71	24.97	4.19	14.55	0
Alatau City					
No. of Affected Plots	49	40	9	0	0
Affected area (Hectares)	83.7	66.84	16.87	0	0
Total					
Total No. of Affected Plots	284	167	52	38	27
Total Affected area (Hectares)	1056.43	728.41	278.09	42.5	7.43

1.6.2 LAND PREPARATION PHASE

Before construction activities commence, land preparation will involve the clearance of trees and vegetation. Subsequently the construction site is levelled to facilitate works, which will include soil excavation, cutting, and stabilizing slopes. Note that these activities were completed by Integra between November 2023 and May 2024.

FIGURE 1-2: EXAMPLE OF SITE LEVELLING WORKS FOR RAILWAY



1.6.3 CONSTRUCTION PHASE

Construction of this Project will involve the construction of civil structures such as bridges, laying of railway track along the RoW, construction of train station and auxiliary installation, commissioning and general landscaping works.

FIGURE 1-3: (LEFT) CONSTRUCTION OF BRIDGES, (RIGHT) TRACK LAYING ALONG RIGHT-OF-WAY



Source: Photo (Left): Almaty Bypass site photo taken by ERM; Photo (Right): Railway Supply

1.6.4 OPERATION AND MAINTAINENCE PHASE

During the operations phase, the bypass is expected to facilitate increased rail freight volumes, enhancing logistical efficiency and connectivity in the region. The Project will only operate freight trains, and it will support 27 trips per day in each direction, averaging approximately 2.25 trains per hour. The railway will operate 24 hours a day, ensuring continuous service. The two (2) types of electric locomotives (**Figure 1-4**) that will run along the bypass are VL-80-S (ВЛ-80-С) and KZ-8A with an average speed of 60 km/hour.

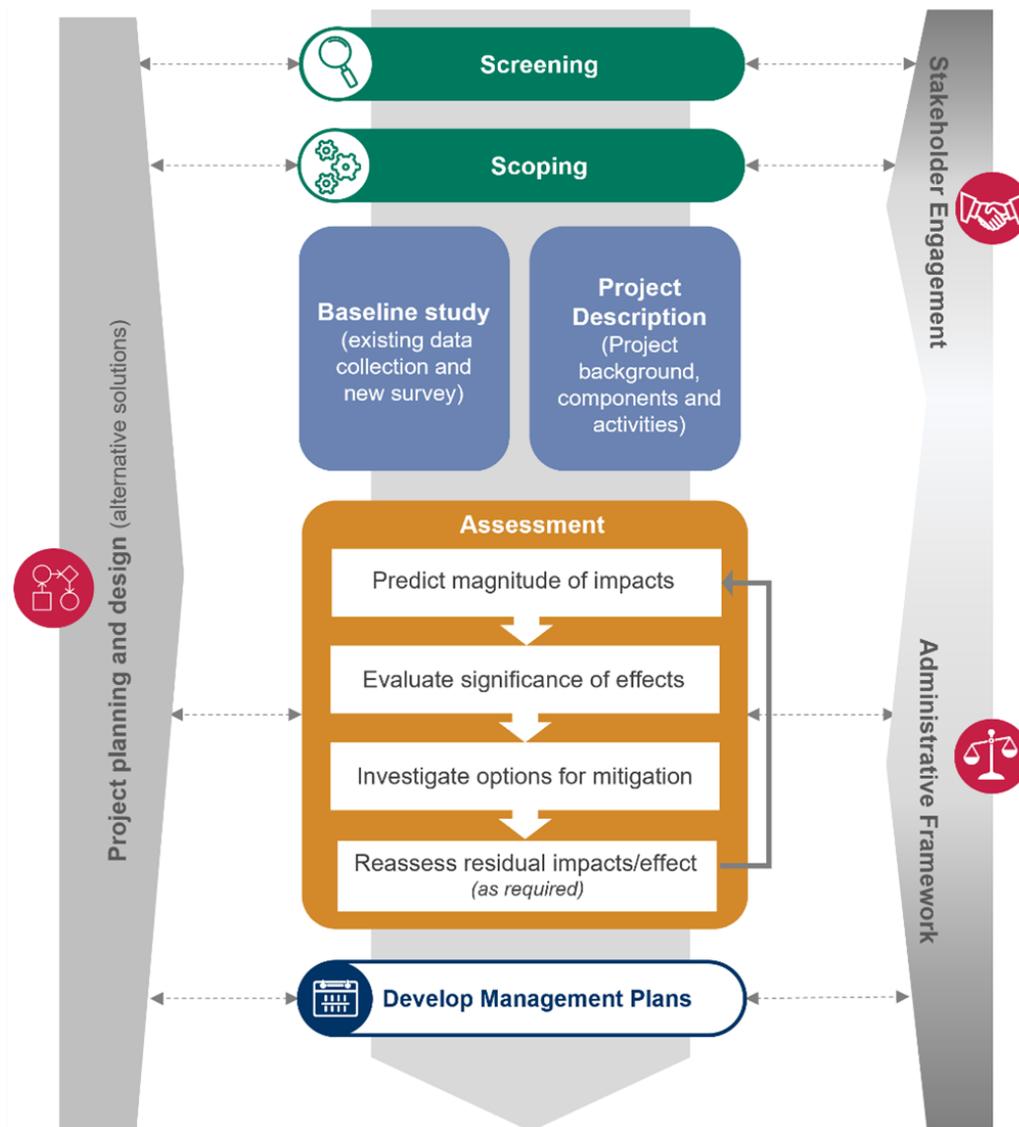
FIGURE 1-4: ELECTRIC LOCOMOTIVE VL-80-S (LEFT) AND KZ-8A (RIGHT)



1.7 IMPACT ASSESSMENT METHODOLOGY

The Impact Assessment (IA) was undertaken following a systematic process that predicts and evaluates the impacts the Project could have on aspects of the physical, biological, social/ socio-economic and cultural environment, and identifies measures that the Project is planning to avoid, reduce, mitigate, offset or compensate for adverse impacts; and to enhance positive impacts where practicable. The methodology has followed the approach illustrated in **Figure 1-5**.

FIGURE 1-5: ERM'S IMPACT ASSESSMENT METHODOLOGY



1.7.1 SCREENING

An Environmental and Social Due Diligence (ESDD) was conducted by the Lenders to identify the main gaps to international standard. The ESDD was used to guide the development of the ESIA. The main gaps identified relate to:

- Insufficient definition of the Project Area of Influence (AoI).
- Limited baseline information and impact assessment related to biodiversity and ecosystem services, cultural heritage, landscape and visual amenities, land use and ownership and other social receptors.
- Lack of consideration for Project climate change impacts and potential impacts of extreme weather events.
- Need for specialist studies on key impacts such as land acquisition and biodiversity impacts.

1.7.2 SCOPING

Scoping was undertaken concurrently with ERM’s reconnaissance activities in late September 2024 to delineate the Area of Influence (AoI) for the Project identify potential interactions between the Project and receptors in the AoI. The environmental and social AoIs are defined in **Section 1.8** below. Interactions were prioritised based on legislation, policy, industry good practice, specialists’ judgements and stakeholder engagement to ensure that the impact assessment focuses on key issues. Interactions deemed insignificant were scoped out, as existing control measures were considered adequate. Meanwhile, the interactions that were scoped in were further assessed and elaborated in the Supplementary ESIA.

1.7.3 EARLY-STAGE DATA COLLECTION

To provide the context within which the impacts of the Project can be assessed, a description of physical, biological, social/socio-economic and cultural conditions that would be expected to prevail in the absence of the Project is presented. At the time of ERM’s engagement, the land preparation and construction work for the Project has already commenced. As such, the data collected would derive from the early stages of the Project development. The early-stage data collection includes information on all resources/receptors that were identified during scoping as having the potential to be significantly affected by the Project. Early-stage data collection for environmental and social scopes was conducted by ERM from 28 October to 8 November 2024, with additional social surveys conducted in January 2025.

Whenever possible, public information, collected during the National EIA and secondary data were used to inform the pre-project conditions. During the scoping phase, data gaps pertaining to noise, biodiversity, socioeconomic conditions and cultural heritage were identified. A targeted on-site data collection process was developed and used.

1.7.4 IMPACT ASSESSMENT PROCESS

Impact identification and assessment comprised of:

- **Impact Prediction:** to determine likely impacts to resources/receptors because of the Project.
- **Impact Evaluation:** to evaluate the significance of the predicted impacts by considering their magnitude and likelihood of occurrence, and the sensitivity, value and/or importance of the affected resource/receptor.
- **Mitigation and Enhancement Measures:** to identify the appropriate measures to mitigate potential negative impacts and enhance potential positive impacts.
- **Residual Impact Evaluation:** to evaluate the significance of potential impacts assuming effective implementation of mitigation and enhancement measures.
- **Impact Management and Monitoring:** to detail how mitigation measures recommended from the impact assessment are to be implemented and specifies monitoring to assess the effectiveness of the proposed mitigation measures.

TABLE 1-2: DESCRIPTION OF IMPACT SIGNIFICANCE

Impact Significance	Description
Negligible significance	An impact of negligible significance is one where a receptor will essentially not be affected in any way by a particular activity, or the predicted effect is deemed to be 'imperceptible' or is indistinguishable from natural background variations.

Impact Significance	Description
Minor significance	An impact of minor significance is one where a receptor will experience a noticeable effect, but the impact magnitude is sufficiently small and/or the receptor is of low sensitivity. In either case, the magnitude should be well within applicable standards.
Moderate significance	An impact of moderate significance has an impact magnitude that is within applicable standards, however, falls somewhere in the range from a threshold below which the impact is minor, up to a level that might be just short of breaching a legal limit. Clearly, to design an activity so that its effects only just avoid breaking a law and/or causing a major impact is not best practice. The emphasis for moderate impacts is therefore on reducing them to a level that is as low as reasonably practicable (ALARP). This does not mean that impacts of moderate significance must be reduced to minor, but that moderate impacts are being managed effectively and efficiently.
Major significance	An impact of major significance is one where an accepted limit or standard may be exceeded, or large magnitude impacts occur to highly valued/sensitive receptors. An aim of IA is to get to a position where the Project does not have any major residual impacts, certainly not ones that would endure into the long-term or extend over a large area.

1.8 AREA OF INFLUENCE (AOI)

The Area of Influence (AoI) is typically defined in the impact assessment process to encompass the area likely to be affected by the Project. These include the activities that are directly owned, operated, or managed (including by contractors) as a component of the Project, associated facilities and the additional areas in which aspects of the environment could be affected. **Figure 1-6** highlight's the Project's AoI.

FIGURE 1-6: PROJECT AREA OF INFLUENCE (AOI)



A summary of the Project receptors and its associated AoI is presented in **Table 1-3**.

TABLE 1-3: AREA OF INFLUENCE FOR ENVIRONMENTAL AND SOCIAL RECEPTORS

Receptor	AoI Description
Air	<ul style="list-style-type: none"> 500m from any construction activities and 200m from construction access roads.
Noise and Vibration	<ul style="list-style-type: none"> Defined as the area over which an increase in environmental noise levels due to the Project can be detected. Extend 1km both sides of the Almaty Bypass and 500m from point noise sources (quarries, construction sites).
Land Environment	<ul style="list-style-type: none"> Limited to the soil and groundwater resources that are directly underneath or adjacent to RoW.
Surface Water	<ul style="list-style-type: none"> Focused on immediate surroundings of the Project Area that have the potential to be most impacted by proposed activities. 1km either side of the Almaty Bypass centreline and associated infrastructure.
Biodiversity	<ul style="list-style-type: none"> The Project’s Area of Influence has been delineated as the Project footprint, along with an established corridor RoW and an additional 500 meters on either side of the RoW.
Social	<ul style="list-style-type: none"> Social AoI has been defined as the Zhambyl District, the Iliy District, the Karasay District, Alatau City and the Talgar District within the Almaty Region in Kazakhstan.
Cultural Heritage	<ul style="list-style-type: none"> 240m corridor (120m from the centreline on both sides of the railway).

1.9 EARLY-STAGE CONDITIONS

The existing physical, biological and social conditions in the AoI are summarised in **Table 1-4**, with a focus on the receptors that may be impacted by the Project. Information provided in this section is based on the information collected from the National EIA, a desktop review of publicly available information, and any other relevant studies that have been undertaken.

TABLE 1-4: SUMMARY OF ENVIRONMENTAL AND SOCIAL EARLY-STAGE CONDITIONS

Receptor	Description
Air quality	<ul style="list-style-type: none"> Air quality data from the National Hydrometeorological Service of the Republic of Kazakhstan were used to inform the 2023 background concentrations of key air pollutants from two (2) locations: Otygen Batyr (15km south of Project) and Almaty city (20km north of project). The following exceedances against national standards were recorded: <ul style="list-style-type: none"> Otygen Batyr: PM_{2.5}, PM₁₀, CO, phenols and H₂S. Almaty City: PM(Dust), PM_{2.5}, PM₁₀, SO₂, CO, NO₂ and NO.
Ambient noise	<ul style="list-style-type: none"> Operational noise mapping from train stations (Kazybek Bek and Zhetygen) equipment within 200m of residential areas were included in the National EIA. The operation noise levels of the train station (from equipment) only were found to be within both the daytime and nighttime residential noise criteria. ERM conducted noise measurements from 29 October to 7 November 2024 during both daytime (07:00 to 22:00) and the nighttime (22:00 – 07:00) periods. The following findings were identified: <ul style="list-style-type: none"> Railway and road traffic are the main noise sources, with farming and livestock adding to it in settlements. At Zhetygen (V11), nighttime noise (62dBA) was higher than daytime (54dBA), likely due to more frequent and longer freight

Receptor	Description
	<p>train operations. Daytime noise varied more often (50-60dBA), while nighttime noise had fewer but louder peaks (up to 70dBA).</p> <ul style="list-style-type: none"> ○ The noise level L_{MAX(1-hr)} measured in the nighttime exceeded the national standards at Kazybek Bek and Zhetygen. ○ The noise level L_{Aeq(1-hr)} measured in the nighttime exceeded the national standard BS RGW IFC EHS guidelines at Zhetygen.
Surface water quality	<ul style="list-style-type: none"> • Project intersects five (5) rivers, including Uzyn Kargaly River, Zhamankyul River, Kaskelen River, Malaya-Almatinka River and Karasu-Baiserke River. • During the early-stage data collection, it was observed that rivers were slightly turbid, but mostly had no visible pollution (foam, oil, algae and litter).
Soil and Groundwater	<ul style="list-style-type: none"> • Soil located in the west of the Sorbulak station and between Sorbulak and Moyinkum Station was primarily composed of sand and clay. • Soil located around the Zhana Arna Station were loamy. • Soil located around Zhetygen station is primarily composed of clay, with some white salt crystal.
Biodiversity	<ul style="list-style-type: none"> • Majority (>60%) of the habitat type are modified habitats that is used for agricultural purposes or as pastureland. The most prevalent natural habitat is the semi-desert habitat, which comprises of 21% of the Project's AoI. Meanwhile, waterbodies comprise of 33% of the Project's AOI. • Species of fauna observed during a rapid biodiversity reconnaissance (from 23 September to 4 October 2024) includes endangered (EN) Steppe Eagle (<i>Aquila nipalensis</i>, vulnerable (VU) Common Pochard (<i>Aythya ferina</i>) and European Turtle-dove (<i>Streptopelia turtur</i>) and Central Asian Tortoise (<i>Agriemys horsfieldii</i>, VU).
Population and demographics	<ul style="list-style-type: none"> • The settlement pattern across the Project area, which spans five districts, is characterised by a concentration of populations in villages and urban centres, with the remaining land primarily used for agriculture. • Within the Project's Right of Way (RoW), large settlements are limited to the villages of Kazybek Bek and Zhetygen, where residential and community infrastructure is concentrated. Along the rail alignment, no other settlements fall within the Project's RoW, with the surrounding areas predominantly consisting of agricultural land. • The population of the Almaty region is mostly made up of working-age adults (over 55%), while young people make up 30-35%, and the elderly form the smallest group (9-11%). • The top five ethnic groups by population size in the Almaty region is Kazakh (35.49%), Russian (7.45%), Uzbek (1.65%), Ukrainian (0.94%) and Uyghur (0.75%).
Land use and livelihoods	<ul style="list-style-type: none"> • The land was primarily used for grazing and agricultural purposes. • The employment distribution for the top five (5) sectors are Forestry and fisheries (17.74%), Wholesale and retail trade; repair of cars and motorcycles (15.55%), Industry (9.73%), Transport and storage (8.97%), Construction (6.76%)
Gender	<ul style="list-style-type: none"> • The population of the females are marginally higher than males, at a ratio of 51:49. • Female lead households are more vulnerable and have lesser access to economic resources and employment opportunities. • Labour force participation for women (63.2%) is lower than men (74.5%). • Females experience a gender wage gap and earn 78% of male's wages.
Education, health and infrastructure	<ul style="list-style-type: none"> • Education is free of charge at public institutions for grade 1 to 11 and is compulsory at the primary and secondary levels. • Almaty lags in health infrastructure and resources when compared to the national average, and have fewer doctors, hospital beds and healthcare facilities. • The leading infectious diseases in Kazakhstan and the Almaty region are acute upper respiratory infections, measles and tuberculosis.

Receptor	Description
Public infrastructures and utilities	<ul style="list-style-type: none"> A majority of the roads in the AoI are paved and in motorable condition. Private motor vehicles are the primary mode of transportation.
Cultural heritage	<ul style="list-style-type: none"> Three (3) archaeological sites are in the vicinity of the Project Area. The closest site is located approximately 200m away from the centreline.

1.10 PUBLIC DISCLOSURE AND STAKEHOLDER ENGAGEMENT

Disclosure of the Project has been undertaken periodically since its public announcement in 2012. On 27 December 2023, a regional public hearing for the National EIA (as per regulatory requirements) was led by the Project’s EIA Consultant, InTech, and Design Engineer, Poligram. This included the Project’s details, key environmental considerations, potential impacts and mitigation measures. The National EIA was subsequently approved on 30 January 2024, after addressing concerns raised during the hearing.

Stakeholder engagement activities were also conducted as part of the Supplementary ESIA, between September 2024 and January 2025. These activities were conducted with Akimat government officials, non-governmental entities (such as conservation groups), project-affected landowners and users, vulnerable groups, workers, contractors and employees on the following:

- To collect indicative baseline information from Project affected (economically and/or physically displaced households) communities to help compile information for pre-project livelihoods and socioeconomic conditions.
- To obtain insights on specific issues or topics on the land acquisition and valuation process.
- To provide the affected communities and stakeholders with opportunities to express their views on Project risks, impacts, and mitigation measures.

Views and concerns from stakeholders have been considered during the Supplementary ESIA, alongside the proposed mitigation measures.

A Stakeholder Engagement Plan (SEP) has been developed as part of the Supplementary ESIA to allow for informed consultation and participation between project stakeholders and the responsible party (KTZ, Akimats, EPC Contractor and other subcontractors). The SEP includes strategies to allow for meaningful engagement, adequate and timely dissemination of information (including disclosure) and documentation of actions. The overall SEP will be reviewed and updated regularly as engagements continue to reflect the outcomes derived from stakeholder meetings into relevant environmental and social management plans.

1.11 ENVIRONMENTAL IMPACT ASSESSMENT

Air Quality

TABLE 1-5: SUMMARY OF AIR QUALITY IMPACT ASSESSMENT

	Impact significance before mitigation	Impact significance after mitigation
Construction Phase		

	Impact significance before mitigation	Impact significance after mitigation
School premises located near Kazybek Bek Station	Moderate for construction dust	Minor
	Negligible for construction traffic exhaust	N/A
Residential and farmland located near other stations and along train alignment	Negligible to Minor*	N/A
Operational Phase		
School premises located near Kazybek Bek Station	Negligible*	Negligible*
Residential and farmland located near other stations and along train alignment	Negligible to Minor	N/A

Note: * Whilst the impact significance rating was negligible additional mitigation measures are recommended

Potential impacts to the air sensitive receptors (ASRs) during the construction phase mainly include emissions from heavy vehicular exhaust and dust emitted from earthworks and construction activities. During operational phase, emissions from light vehicle exhaust due to increased traffic accessing the station is identified as the predominant air emission source.

The impacts of dust during the site preparation and construction phase were assessed in accordance with the UK IAQM Guidance on the Assessment of Dust from Demolition and Construction. Construction and operational traffic emissions was assessed using the ADMS Roads dispersion model using information on the traffic flows, traffic speeds, road characteristics, surrounding area and local meteorology.

The results of the assessment showed that unmitigated impacts for construction dust at construction sites near the Kazybek Bek Station were classified as **Moderate**, primarily due to the two (2) school receptors within Kazybek Bek Village; and unmitigated impacts for construction traffic exhaust at construction sites near Kazybek Bek Station were classified as **Negligible**. By implementing the recommended mitigation measures at Kazybek Bek Station, the impact significance of construction dust at Kazybek Bek Station was anticipated to be reduced to **Minor**. The key air quality control and mitigation measures include but not limited to development of air pollution control plan (within Construction Management Plan), traffic management plan, dust suppression measures, regular preventive engine maintenance and engine exhaust tests for construction machinery and motor vehicles. In contrast, the impacts along the alignment were deemed negligible, as the surrounding area comprises of agricultural plots and scattered human settlement areas with lower sensitivity.

During operations, fugitive emissions from vehicle exhaust due to increased traffic to stations is expected. The impact significance during operations at school premises near Kazybek Bek Station is expected to be **Negligible**, based on predicted traffic levels.

Noise

TABLE 1-6: SUMMARY OF NOISE IMPACT ASSESSMENT

	Impact significance before mitigation	Impact significance after mitigation
Construction Phase		
Receptors within 50m from Kazybek Bek and Zhetygen stations	Moderate to Major	Negligible to Minor
Receptors at the rest of the segments	Negligible	
Operational Phase		
Significance (for trains operating at 60 km/hr)	Major within 40m from railway centreline	Minor
	Moderate between 40m to 140m from railway centreline	
	Negligible beyond 140m from railway centreline	
Significance (for trains operating at 40 km/hr)	Major within 30m from railway centreline	
	Moderate between 30m to 80m from railway centreline	
	Negligible beyond 80m from railway centreline	
Significance (for trains operating at 20 km/hr)	Major within 10m from railway centreline	
	Moderate between 10m to 40m from railway centreline	
	Negligible beyond 40m from railway centreline	

During construction, noise impacts from construction equipment were evaluated using a worst-case scenario that included earthworks, linear works, and structural works, guided by the USFTA’s Transit Noise and Vibration Impact Assessment Manual. The predicted noise levels showed that the unmitigated noise impacts during the construction phase were **Negligible to Major** within 50 meters of the site activities from Kazybek Bek and Zhetygen stations. Other than the area near the two stations, the predicted noise impacts is **Negligible** due to the lack of NSRs. Mitigation measures were proposed and considered during the residual noise impact assessment which include but not limited to:

- Installation of temporary construction noise barriers/screens along the border of the RoW (e.g. earthen mounds, walls, and vegetation).
- Limiting noisy activities to specific hours (e.g., daytime) to reduce disturbances.

Implementation of the noise control mitigation and management measures during construction will result in a residual impact significance of **Negligible to Minor**.

During operations, noise impacts will arise from the operation of trains and train stations. The predicted noise levels were calculated in accordance with the USFTA's Fixed-Guideway General Noise Assessment, which considers factors such as train speed, train traffic volume, the number of locomotives, and rail vehicles. Three (3) train speeds were analysed: (i) operating at 60 km/hr between stations, (ii) operating at 40 km/hr at 1.5km from station and (iii) 20 km/hr at 100m approaching station. Across all operating speed, the pre-mitigation impact significance ranged from **Negligible** to **Major**, depending on the receptor distance from the railway alignment and the train operation speed.

Additionally, the operation of the train stations is expected to generate noise from several mechanical equipment, including centrifugal fans, pumping stations, transformers, boiler rooms, and compressors. These train station sources were modelled during the National EIA, resulting in an overall pre-mitigation significance classification of **Negligible to Minor**.

To mitigate the operational noise impacts, the following measures are proposed:

1. Installation of noise barrier along railway alignment within impact zone.
2. Monitor noise complaints and provide appropriate mitigations if needed.

Vibration

TABLE 1-7: SUMMARY OF VIBRATION IMPACT ASSESSMENT

	Impact significance before mitigation	Impact significance after mitigation
Construction Phase		
Beyond 30m from site activities	Negligible	Negligible
Within 30m from site activities	Minor to Major	
Operational Phase		
Beyond 30m from site activities	Negligible	N/A

Ground-borne vibration may be caused by various construction activities, including excavation, piling, drilling and blasting for burrow areas. USFTA Transit Noise and Vibration Impact Assessment Manual was utilised to assess potential effects from construction vibration for each piece of equipment during the worse-case scenario of earth works activities. Based on assessment, the impact significance within 30m of construction activities ranged from **Minor** to **Major**, depending on the distance from the receptors. As vibration dissipates over distance, impacts beyond 30 meters were deemed **Negligible**. As the locations for the construction equipment are assumed to be within site boundary (which is over 30m), the impact significance shall be negligible. Recommended mitigation measures to further control construction vibration include:

- Enhancing the rigidity and vibration-damping characteristics of structures and materials.
- Implementing vibration isolation techniques using vibration-dampening supports, flexible gaskets, structural gaps, resonators, enclosures, and other methods.

Implementation of the vibration mitigation and management measures during construction will result in a residual impact significance of **Negligible**.

During operations, the source of vibration is from the freight train travelling along the track. Train-induced vibrations is dependent on the smoothness of the wheels and rails, and on the train suspension and track's support systems as they exhibit resonant behaviour that results in increased vibration. The results of the operational vibration assessment indicated that beyond 30 meters from the railway centre, the impacts were either barely perceptible or distinctly perceptible. The vibration impact for sensitive receptors located beyond 30m from rail centreline during operation was assessed as **Negligible**, no further mitigation measures are recommended.

Soil and Groundwater

TABLE 1-8: SUMMARY OF SOIL AND GROUNDWATER IMPACT ASSESSMENT

	Impact significance before mitigation	Impact significance after mitigation
Construction Phase		
Soil and groundwater resources	Minor	N/A
Operational Phase		
Soil and groundwater resources	Minor	N/A

A qualitative assessment on soil and groundwater impact was conducted based on findings from the National EIA, engineering and hydrometeorological surveys and publicly available information.

During construction, the potential sources of soil and groundwater impact were expected to occur from:

- Decrease groundwater baseflow due to use of groundwater for construction activities.
- Contamination of soil and groundwater quality from improper handling of hazardous chemicals on site and hazardous waste generation.
- Degradation of soil fertility due to removal of soil-vegetation layer.

During operation, the potential impacts were expected to arise from:

- Contamination of soil and groundwater quality from improper handling of hazardous chemicals on site and hazardous waste generation.
- Scour or soil erosion due to construction of bridges and culverts

The National EIA determined that there is sufficient groundwater flow and source for construction activities, and its use will not significantly affect groundwater availability for household and industrial purposes. Furthermore, the project has conducted site-specific geology assessments, soil stabilisation techniques and engineering solutions designed for seismic resilience. Embedded control measures include proper waste handling and storage, containment structures for hazardous chemicals and waste, and the rehabilitation and restoration of soil and vegetation to their original conditions to minimise impacts. As a result, the impact significance was assessed to be **Minor** with the implementation of these embedded controls; therefore, no further mitigation measures are required during construction and operation.

Surface Water and Hydrology

TABLE 1-9: SUMMARY OF SURFACE WATER AND HYDROLOGY IMPACT ASSESSMENT

	Impact significance before mitigation	Impact significance after mitigation
Construction Phase		
Surface water quality	Minor	N/A
Hydrology	Minor	N/A
Operational Phase		
Surface water quality	Minor*	Minor
Hydrology	Minor	N/A

Note: * Whilst the impact significance rating was negligible additional mitigation measures are recommended

A qualitative assessment was conducted on the Project's construction and operational impacts on water quality and hydrology. During construction, potential sources of impacts arise from exposed soil surfaces, which can lead to increased silty runoff into water bodies, resulting in elevated turbidity and total suspended solids (TSS). As the water bodies do not support diverse populations of flora and fauna, the pre-mitigation impact significance was classified as minor. Additional mitigation measures were recommended, including the development of a stormwater and erosion control plan, along with the implementation of silt fences and sediment traps around exposed soil areas and stockpiles to minimise runoff, and a weekly surface water quality monitoring program at sensitive receptors with appropriate follow-up actions should water quality thresholds be exceeded.

The construction of bridges and culverts where the alignment intersects major rivers, and smaller waterbodies can disrupt local drainage patterns and cause upstream flooding by restricting high flows if they are inadequately sized or designed. There may also be an increase in stormwater peak flow contributions resulting from land use changes during construction. Engineering studies were conducted in accordance with national requirements, to ensure that proper construction and design considerations were implemented by the Project to minimise flooding impacts. For example, the bridges are designed to handle a substantial flooding event that has a 1% chance of occurring in any given year. Furthermore, the affected rivers are equipped with engineering controls to manage flooding, including sediment retaining structures (Kaskelen River), mudflow protection dams (Uzyn Kargaly and Zhyngyldy river) and flood regulating dams (i.e. Malaya Almatinka and Karasu Baiserke river). With these embedded controls in place, the impact on hydrology was assessed to cause only **Minor** impacts during the construction phase.

During operations, impact to water quality arise from contamination due to improper handling during storage and disposal of wastewater from maintenance areas, fuel storage and refuelling areas, accidental spill and leakage during use and storage of hazardous substances and use of herbicides for trackside maintenance activities. The significance of the impact was evaluated as **Minor** due to its low likelihood of occurrence. Additional mitigation measures were recommended, including installation of oily-water separators, the provision of containment facilities for the storage of hazardous chemicals, and the implementation of controls and procedures for the proper handling of substances and spills.

Biodiversity

TABLE 1-10: SUMMARY OF BIODIVERSITY IMPACT ASSESSMENT

Impact	Receptor	Impact significance before mitigation	Impact significance after mitigation
Construction Phase			
Habitat loss and modification	Habitat	Moderate	Minor
	Species	Minor to Moderate	Negligible to Minor
Introduction and Proliferation of Invasive Alien Species (IAS)	Habitat	Minor*	Negligible
	Species	Minor*	Negligible
Impacts on aquatic ecology	Habitat	Moderate	Minor
	Species	Minor*	Negligible
Operation Phase			
Wildlife Mortality Risks	Species	Moderate to Minor	Minor to Negligible
Habitat fragmentation, degradation and wildlife barriers	Habitat	Minor*	Negligible
	Species	Moderate	Minor
Collision and Electrocutation Risks from Transmission Line	Species	Moderate	Minor

Note: * Whilst the impact significance rating was minor additional mitigation measures are recommended

The Project passes to the south of the Sorbulak Lake System, which is designated as a Key Biodiversity Area (KBA)/Important Bird Area (IBA). The main lake is located approximately 5km to the north of the project, and small waterbodies of the Sorbulak Lake System within Project AoI were found to be dry and lacked suitable habitat to support large numbers of migratory or congregatory species that may potentially move from the lake system. Consequently, construction and operational activities are not expected to impact the habitats or biodiversity values of the Sorbulak Lake System. A critical habitat screening was conducted in accordance IFC PS6 which determined that none of the critical habitat criteria were triggered. Meanwhile, the biodiversity values identified during the screening were incorporated into the impact assessment, where further evaluations were conducted.

The construction of the Project will result in direct habitat loss and modification of 13.5 hectares of natural riverine habitat and 51.8 hectares of natural semi-desert habitat within the RoW, both of which are known to support species of conservation significance. Construction activities can facilitate the introduction and spread of Invasive Alien Species (IAS) through the movement of equipment, materials and physical disturbance of habitats which provide favourable conditions for IAS to proliferate. However, it is important to note that a significant portion of the alignment traverses a mosaic of highly degraded and overgrazed areas, interspersed with some patches of relatively better condition steppe grasslands. The AoI is also

under existing pressure from grazing, which contributes to the introduction and proliferation of IAS. Furthermore, Surface runoff from construction works can degrade water quality and deteriorate aquatic habitat conditions.

The overall impact significance on habitat and species from construction activities across impacts are rated as **Minor to Moderate**. To mitigate impacts, a Biodiversity Management Plan (BMP) will be developed to detail management and monitoring measures. These measures will include installation of barriers to minimise fall and entrapment risks for target species, pre-felling inspections to identify presence of active avifauna nests and burrows, rescue and rehabilitation procedure and use of native plants for land restoration activities. With proper implementation of these mitigation measures, significance of the residual impact may reduce to minor to negligible for both habitat and species.

During operations, the risk of wildlife mortality associated with collisions with moving trains is a primary concern. Gregarious avian species traveling in flocks are highly vulnerable, with train strikes often resulting in multiple fatalities during single events. Increased mortality can also arise from entrapment along railway tracks, collisions and electrocution with transmission lines. Raptors and occasionally wetland-associated migratory birds face significant risks due to the low visibility of transmission lines, which increases the likelihood of collisions. Additionally, these birds are at risk of electrocution if they connect two live components while perched or landing on the infrastructure. The pre-mitigation impact significance is assessed as moderate, as most species utilising these habitats are classified as least concern and are common and widespread within the landscape. Also, the area is not a known wildlife corridor, congregatory site or roosting sites for resident and migratory avifauna. Proposed mitigation measures within the BMP are expected to reduce the impact significance to **Minor** through the following actions:

- Development of wildlife monitoring plans to identify areas of high collision risk, leading to the implementation of targeted measures such as wildlife fencing and culvert crossings to minimise direct collisions.
- Implement habitat restoration or enhancement projects along the railway corridor to provide additional roosting grounds.
- Establish vegetation buffers near river crossings to support avian and small mammal species.
- Provide training for all relevant railway personnel on wildlife risk awareness, collision reporting, and how to handle wildlife sightings or accidents.
- Installation of bird divertors and insulation on transmission lines.

Long-term impacts of operations extend to habitat fragmentation and disturbance. The physical infrastructure of the railway divides continuous ecosystems into smaller, isolated patches, which can reduce available habitat and impede migration, feeding, and breeding activities for wildlife. As the AoI is part of a larger, contiguous landscape with alternative habitats of comparable or higher quality readily available for species, the partial habitat loss does not threaten habitat functionality or long-term viability, resulting in an impact significance rated as **Minor**. Meanwhile, disturbance from noise and vibration of passing trains can cause sensitive fauna such as the Central Asian Tortoise and Steppe Eagle to be displaced from their habitats, as such impact significance to species was rated as **Moderate**. However, the

implementation of mitigation measures outlined in the BMP is expected to reduce the impact significance to **Minor**.

Greenhouse Gas

The Project is expected to contribute to greenhouse gas (GHG) emissions, primarily from Scope 1 and 2 sources. During construction, emissions will arise from vegetation clearance, mobile combustion from construction equipment and transport vehicles, and stationary combustion. During operations, emissions will arise from the electricity used for the operation of the electrified railway track. The table below provides a breakdown of the estimated carbon footprint associated with these activities:

TABLE 1-11: SUMMARY OF GHG EMISSIONS DURING PROJECT LIFECYCLE

Phase	Total GHG Emissions		
	tCO ₂ e (annual)	tCO ₂ e (total)	Percentage (%)
Construction (Year 1-2)	18,560	36,840	2.1%
Operation (Year 3-32)	57,968	1,739,028	97.9%

A high-level Relative Emissions Assessment was conducted to understand the total avoided emissions from the project. Overall, the project contributes to avoiding 75,960 tCO₂e of emissions per year against a scenario where transport of freight would continue to take place by diesel locomotives.

Given that the largest source of emissions comes from electricity consumption, a key consideration is the decarbonization of the electricity grid through the transition to renewable sources. This shift can significantly reduce overall emissions during the operation phase. However, it is important to note that transitioning to renewable sources lies beyond the project’s direct control. For stationary emissions, it is recommended to electrify equipment and reduce reliance on diesel or liquified petroleum gas as they emit higher levels of GHG and other pollutants. Making the switch to energy efficient products can also help to decrease emissions by consuming less power for the same level of performance.

Physical Climate Change Risk

An assessment was conducted to identify and understand the implications of climate change on the Project for both baseline and future time horizons, in alignment with the recommendations of the Task Force on Climate-related Financial Disclosures (TCFD). The assessment was conducted by gathering climate data for all relevant physical hazards for both baseline and future time horizons. This data was used to explore how each relevant physical hazard is projected to change over time, ultimately leading to a risk assessment that evaluates the potential materiality of climate risks. The assessment revealed the following physical risks:

TABLE 1-12: SUMMARY OF PHYSICAL RISKS

Hazard Type	Hazard Level		Residual Risk
	2030	2050	
Extreme heat	Moderate	Moderate to Very High	Negligible

Hazard Type	Hazard Level		Residual Risk
	2030	2050	
Extreme Cold	High	Moderate	Negligible
River Flooding	High	High	Low
Extreme Rainfall	High	High	Low
Water stress	Minimal	Minimal	N/A
Wildfire	Very High	Very High	Moderate
Coastal flooding, rainfall-induced landslides, and extreme winds and storms	Minimal	Minimal	N/A

Existing embedded measures have been incorporated into the rail design including selection of track to withstand extreme temperature fluctuation, consideration of flood risk in bridge design, while safety measures for workers include regulations on working hours during extreme temperatures. The assessment of physical risks indicates a range from moderate to negligible across various hazard types. However, moderate risk remains for wildlife. To mitigate this risk, recommendations include regularly clearing dry vegetation around the tracks and establishing joint response teams in collaboration with fire departments to enhance firefighting efforts along railway corridors.

1.12 SOCIAL IMPACT ASSESSMENT

Physical and Economic Displacement

TABLE 1-13: SUMMARY OF LAND ACQUISITION AND INVOLUNTARY RESETTLEMENT IMPACT ASSESSMENT

	Impact significance before implementation of LRP and RF	Impact significance after implementation of LRP and RF
Physical displacement of landowners and users	Moderate	Minor
Economic displacement of landowners	Moderate	Minor
Economic displacement of land users	Moderate	Minor
Economic displacement impacts on commercial entities	Moderate	Minor
Workers facing loss of employment due to land acquisition	Moderate	Minor
Loss of communal grazing lands and disruption of household or community activities	Minor	Negligible

Land required for the construction of the railway tracks, stations, and quarries for material supply involves the acquisition of private and leased land, as well as government-owned land. The Project will permanently affect approximately 1,056.43 hectares of land (284 land parcels⁷) across five districts. The 284 land parcels comprised of 117 state-owned parcels and 167 privately-owned parcels, with the distribution as follows: 75 parcels in Iliy District, four (4) in Karasay District, 41 in Talgar, seven (7) in Zhambyl, and 40 in Alatau City. As of 19 December 2024, the Project status of the 167 privately owned land plots measuring 728.41 hectares (68%) is as follows:

- Land acquisition and compensation for 64 plots is complete.
- Land acquisition and compensation for 77 plots is ongoing⁸.
- Land acquisition and compensation for 10 plots has recently been initiated (for the newly identified plots in Alatau City- this will involve physical displacement).
- Land acquisition and compensation is not required for 26 land plots⁹.

The privately-owned land is primarily used for peasant farming¹⁰ and commercial agriculture.

The land acquisition resulted in both physical and economic displacement for affected landowners, land users (including leaseholders, tenant farmers) and workers. Economic displacement occurred due to the loss of livelihoods as land becomes unavailable for farming and agricultural activities, resulting in landowners losing their land and income. Other indirect impacts on livelihoods stemmed from the loss of access to other lands, land fragmentation, or being left with an unviable piece of land after land acquisition.

Physical displacement is likely to occur in one location, that is the settlement around Zhetygen station, due to land acquisition for the Project, resulting in the loss of residential structures and the need to secure alternative housing (**Figure 1-7**). Likely indirect impacts include the disruption of social networks, loss of access to essential services, and challenges in adapting to new living environments. In some cases, relocation can also lead to increased living costs or financial burdens associated with securing replacement housing. Physical displacement is expected to impact approximately 13-15 households that require relocation. At the time of the site visit in January 2025, Project boundaries were yet to be finalised, and the affected land and assets were yet to be formally appraised by a licensed valuator.

⁷ With the inclusion of 10 new plots from Alatau City as of January 2025.

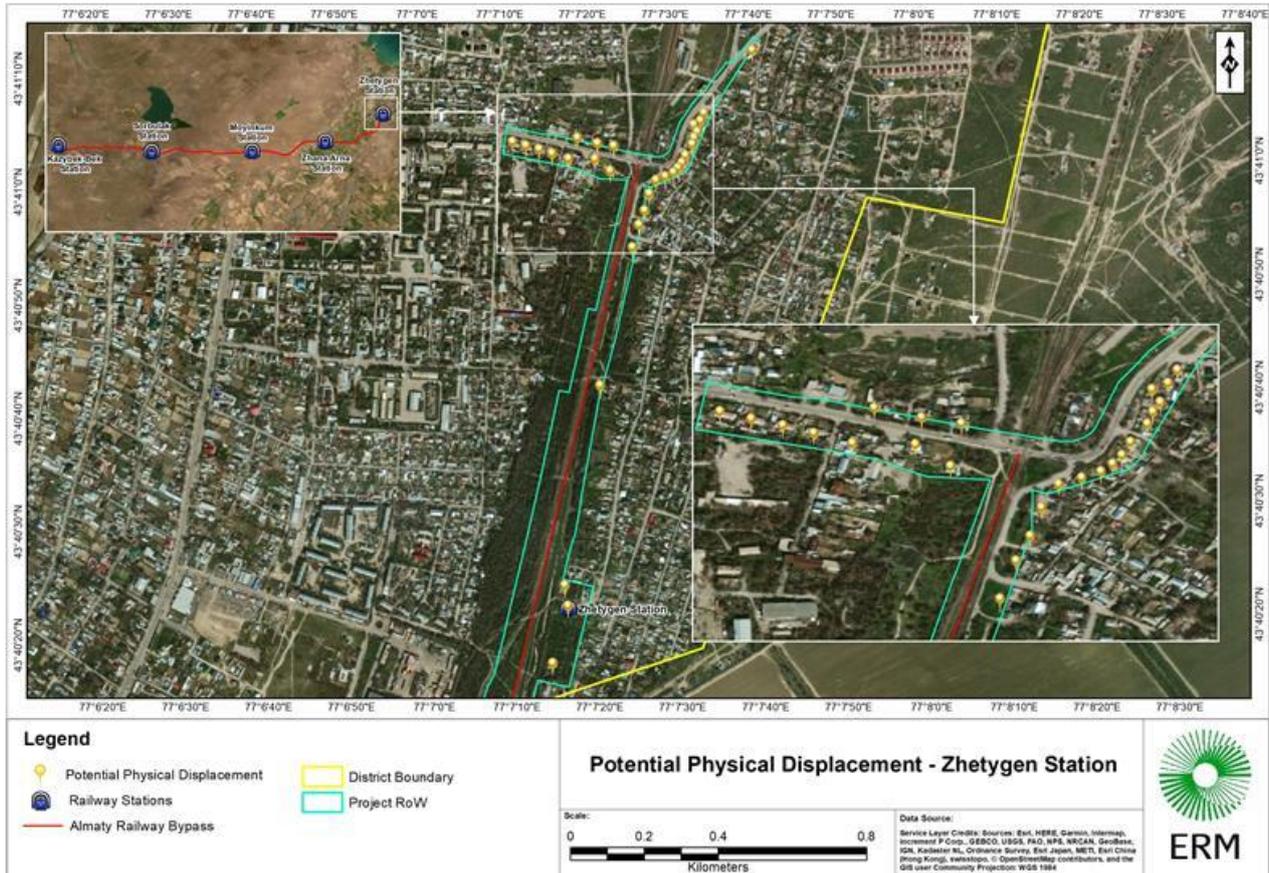
⁸ ERM was told during the KIIs that for privately owned plots, construction activities do not begin on land until compensation is fully complete.

⁹According to consultations with the Akimats, land plots which “do not require acquisition” may refer to those which are:

- Private land plots: very small and considered insignificant in size and hence voluntarily donated upon negotiation with the landowner, or KTZ and the Akimat work directly with the user to reconfigure the land plot;
- State-Owned Land under Lease: land plots which are returned to the state.
- Existing KTZ-owned land and Other State-Owned land: not under the purview of the Akimats.

¹⁰As per the National EIA, and the Decrees issued, the local terminology used for this type of land use is “ведение крестьянского хозяйства”, which translates to “management of peasant farm”. For the remainder of this Supplementary ESIA, the terminology “peasant farming” is used when referring to management of peasant farming on private land, and “leased farming” when referring to management of peasant farming on leased land.

FIGURE 1-7: PHYSICAL DISPLACEMENT AT ZHETYGEN STATION



A Livelihood Restoration Plan and Resettlement Framework have been included as part of the management plans of the ESIA.

Key recommendations for the economically displaced are outlined below:

- Fragmented land (inaccessible or unusable):
 - Provide alternate access in coordination with the Akimats (viability of providing alternate access to be determined by KTZ).
 - If not possible, the fragmented land should be purchased.
- Unviable land:
 - Provide compensation for unviable land and to procure the unviable land (provision is stated in the legislation¹¹, but only gets triggered if affected people request this).
 - Process support: Implementation team to explore legal means to do so, for closed cases, and to add it for the ongoing cases where relevant. Valuator to assess if remaining land is unviable.
- Measures to align with IFC PS5's full replacement cost principle, include:
 - Reimbursement of transaction costs (reimbursement against expenses incurred for buying replacement land)¹²;

¹¹ The Land Code, Article 86.1.

¹² Eligibility elaborated in the LRP-RF.

- Compensation and retrospective compensation (through grievance process) of those who have already been compensated for assets where depreciation was deducted in the compensation of assets.
- Livelihood restoration support for Project affected entities. These include opportunities skills training, financial literary and skill development programmes to those eligible
- Support in access to alternate land to be leased
- Financial compensation, transitional allowances for vulnerable groups and support for livestock rearing (including green fodder and veterinary support) to mitigate income loss
- Identify and allocate alternative grazing areas near the affected communities and facilitate community-based grazing initiatives
- Separating the PAEs already compensated from PAEs yet to be compensated and provide Community Disclosure of the LRP and access to the Project’s Grievance Redressal Mechanism (GRM).
- Special considerations for those vulnerable: livelihood programmes and transition allowances.

Key strategies included in the resettlement framework, for the physically displaced are outlined below:

- Avoidance of forced evictions and ensuring that all physically displaced persons receive support.
- Compensation at full replacement cost for all landowners, with independent valuation and top-up payments if needed.
- Support for informal/unregistered occupants through moving allowances and transition support (if vulnerable).
- Resettlement Assistance in the form of assisted self-relocation, covering transaction costs of purchasing replacement housing and temporary housing support (if needed).
- Stakeholder engagement and Grievance Redressal Mechanisms (GRM) to ensure transparency and fair treatment.
- Post-Resettlement Monitoring to assess outcomes and provide further support to vulnerable groups.

Labour and Working Conditions

TABLE 1-14: SUMMARY OF LABOUR AND WORKING CONDITIONS IMPACT ASSESSMENT

	Impact significance before implementation of ESMP	Impact significance after implementation of ESMP
Construction labour and working conditions	Minor*	Negligible
Operational labour and working conditions	Moderate	Minor

Note: * Whilst the impact significance rating was negligible additional mitigation measures are recommended

The assessment of labour and working conditions identifies key gaps between requirements in IFC PS2 and the Labour Code of the Republic of Kazakhstan, which includes limited protection or mechanisms to enforce protection on workplace discrimination, migrant workers, forced and bonded labour, child labour, occupational health and safety (OHS) and workplace accommodation standards. To bridge these gaps, the Project has safeguards such as prioritizing local procurement, which helps minimise the risk of workplace discrimination due to the low number of migrant workers, if any, present in the workforce. Furthermore, project-specific safety requirements include the identification of hazardous areas with appropriate warning signs, labour safety training for workers, designated areas for first aid kits and emergency response equipment, and an access control system (ACS) that restricts entry to unauthorized individuals and ensures that only qualified personnel are on site. It is noted that the Project will not involve any foreign migrant workers and that Kazakh workers, including those from Project Districts and overall Almaty Region, will be employed. Overall, the impact significance is assessed to be minor, considering the additional measures imposed by the Project and the EPC Contractor, with the likelihood of major violations related to child and forced labour being considered low.

During operations, workers may encounter OHS risk associated to equipment operation and exposure to hazardous materials. The Labour Code mandates sector-specific OHS standards for hazardous industries, including railways. Employers must establish safety protocols, conduct periodic risk assessments, and mitigate physical hazards like noise, vibration, and ergonomic strains. The overall impact significance is assessed as moderate, with residual impact significance assessed to be minor through implementation of OHS management plan within the Environmental and Social Management Plan (ESMP) which includes a permit-to-work system, emergency drills and preparedness, as well as training and monitoring. The OHS management plan is aligned with Good International Industry Practice.

Community Health and Safety

TABLE 1-15: SUMMARY OF COMMUNITY HEALTH AND SAFETY IMPACT ASSESSMENT

	Impact significance before implementation of ESMP	Impact significance after implementation of ESMP
Construction Phase community health and safety	Moderate to Major	Minor to Moderate
Operations Phase community health and safety	Moderate	Minor

Construction phase community health and safety impacts and risks includes:

- Impacts associated with in-migration due to the Project’s labour requirements:
 - Presence of security personnel leading to risk of conflict;
 - Change in community dynamics; potential increase of gender-based violence;
 - Spread in infectious diseases;
 - Strain on public and social infrastructure; and
- Impacts associated with transport movements (increased traffic causing injuries and/or loss of life) and general construction activities (pollution from noise, vibration and dust affecting health).

The presence of security personnel on-site may raise sensitivities and the potential for tension. However, the risk of conflict is low, as only 1-2 unarmed security personnel are stationed at night in labour camps, storage areas, and vehicle parking areas, which are located far from settlement areas. The Project may also change community dynamics, potentially leading to an increase in gender-based violence as the workforce is predominantly male and away from home. The construction of labour camps for worker accommodations is also expected to reduce the spread of infectious diseases such as acute upper respiratory infections, measles, and tuberculosis.

Additionally, construction works are expected to lead increase in noise, dust, and vibration which can cause nuisance and health impacts including exacerbation of respiratory diseases prevalent in the region (e.g. upper respiratory tract infections). These impacts have been addressed in the EIA above (see **Section 1.11**) with consideration for community health. Proposed mitigation measures have also been outlined in the preceding sections. Furthermore, increased traffic due to movement of construction vehicles and machinery can cause injuries and/or loss of life. As such the pre-mitigation impacts were assessed to be **Moderate to Major**. To mitigate these risks, the ESMP includes recommendations aligned with the “Environmental, Health, and Safety (EHS) Guidelines for Railways” such as traffic management plans, health and safety protocols, community engagement initiatives, and gender-based violence prevention programs. Overall, the post-mitigation impact on community health and safety is expected to range from **Minor to Moderate**.

Operation phase community health and safety impacts and risks includes:

- Increased risk of traffic accidents at level crossings, involving trains and users (vehicular, pedestrian, livestock) utilising the crossings as walkways, which could lead to injuries or loss of life.
 - Potential mitigation measures to mitigate the risk of traffic accidents, include installation of adequate signage and signals, the use of barriers and gates, and public awareness campaigns.
 - Developing and implementing a comprehensive Emergency Response Plan (ERP) that includes coordination between railway operators and local emergency services.
- Increased exposure to noise and vibrations for affected communities.
 - Operations of freight trains will also result in noise and vibration impacts and proposed mitigation measures are addressed in the sections above (see **Section 1.11**).

The implementation of mitigation measures is expected to reduce the impact (risk) significance from **Moderate to Minor**.

Economic and Employment Opportunities

The Project is expected to create employment opportunities. During construction, approximately 1,500 workers are required, with local labour likely to contribute as auxiliary workers and qualified specialists for construction and installation tasks. Additionally, the Project’s procurement process is governed by state laws, requiring that the purchase of goods, works, and services prioritize sourcing from local producers where possible. This focus on local sourcing can lead to indirect employment opportunities through jobs related to the supply of

goods and services necessary to support the Project's construction process, including food and transportation services, as well as other support services needed for labour accommodation.

Gender-Differentiated Impacts

TABLE 1-16: SUMMARY OF GENDER-DIFFERENTIATED IMPACTS

	Impact significance before mitigation	Impact significance after mitigation
Impacts on women, including risks of gender-based violence and harassment	Moderate	Minor

The overall impact of gender-differentiated impacts is assessed to be **Moderate** considering national legal protections afforded to women and the increasing focus on autonomy and self-care in younger generations of women in Kazakhstan as suggested by focus group discussion respondents. Mitigation measures are detailed in the Environmental Social Management Plan (ESMP) and Livelihood Restoration Plan (LRP) and include:

- Targeted programs for women, such as financial literacy training, access to microloans, and skill development workshops to lower the impact significance to **Minor**.
- Establishment of clear codes of conduct for workers, with zero-tolerance policies for GBV, harassment, and exploitation.
- Establishment of hiring quotas or outreach programs to encourage women to apply for operational roles, particularly in non-traditional sectors such as engineering and operations.
- Ensure the GRM is gender-sensitive and accessible, with provisions for confidential reporting and resolution of gender-specific grievances.
- Provision of well-lit and safe pedestrian crossings, particularly in areas frequently used by women and children.

Cultural Heritage

TABLE 1-17: SUMMARY OF CULTURAL HERITAGE IMPACT ASSESSMENT

	Impact significance before mitigation	Impact significance after mitigation
Impacts of Construction and operational activities on uncovering cultural heritage resource	Minor	Negligible

Note: * Whilst the impact significance rating was negligible additional mitigation measures are recommended

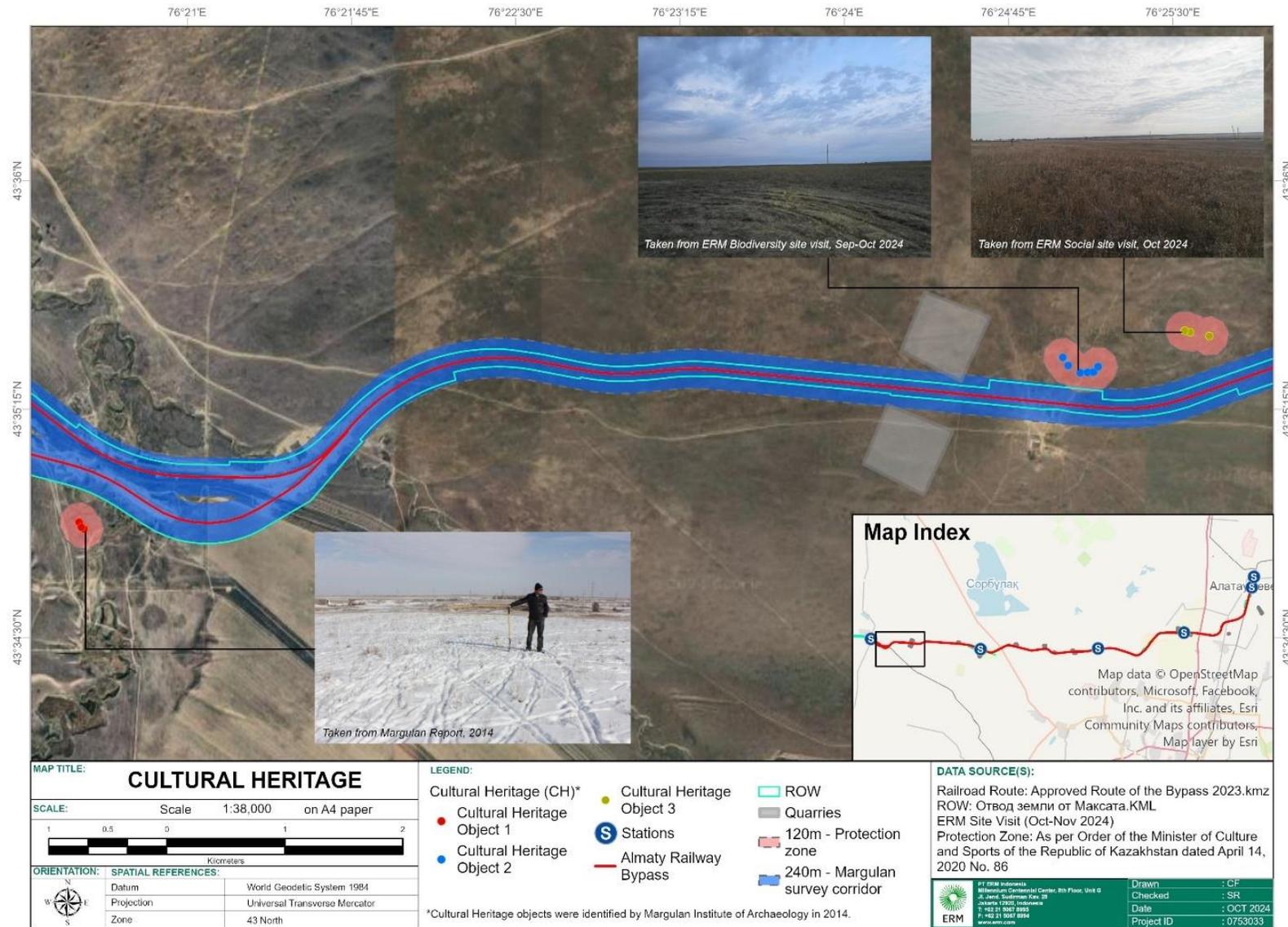
An archaeological assessment was performed by Margulan University Institute of Archaeology in 2014 and 2024. While there are no UNESCO designated world heritage sites or nationally designated archaeological sites within the Project Area, the assessment sought to identify archaeological sites (or objects) of local significance within a 240m wide corridor (120m on either side of the railway) as all construction works (except the location of quarries) would be carried out within the corridor. Notably, the assessment identified three archaeological sites related to mounds and burial grounds dating back to the early Iron Age located outside of the 240m corridor. While the physical footprint of the archaeological sites lies outside the corridor,

the surveyed corridor intersects with the outer edge of the 120m protection zone¹³ of six burial mounds) (CH No. 2, as per **Figure 1-8**). It was determined that there is no direct impact to the archaeological site as no construction activities were observed within the protection zone, as such the impact significance was awarded as minor.

To mitigate potential impacts, the recommended mitigation measures include implementation of a Cultural Heritage Management Framework (CHMF). The CHMF contains a Cultural Heritage Site Screening, a Chance Finds Procedure which outlines the steps to be taken if should cultural heritage resources be discovered unexpectedly during construction or operational activities and a Kurgan Archaeological Landscape Mitigation and Management Guideline, which is a guiding document to manage and conserve the recorded kurgan sites in the vicinity of the Project during construction or operation activities.

¹³ The total boundary of the protection zone for sacred objects cultural heritage, such as mounds and burial grounds of the Iron Age shall be, as per the Order of the Minister of Culture and Sports of the Republic of Kazakhstan dated 14 April 2020 No. 86, on the "rules for determining the protection zone, the zone for regulation of constructions and the zone of the protected natural landscape of the monument of history and culture and the regime for their use", equal to a minimum of 120 meters, which refers to 40 meters protection zone + 40 meters zone for regulating the development + 40 meters for the zone of the protected natural landscape.

FIGURE 1-8: LOCATION OF KEY CULTURAL HERITAGE RESOURCES



1.13 RAPID CUMULATIVE IMPACT ASSESSMENT

A rapid cumulative impact assessment (RCIA) was conducted to assess the cumulative impacts on chosen valued environmental, ecological and social components (VECs) in an identified spatial boundary. Following guidelines of the IFC, a six-step approach to the RCIA has been adopted. The approach includes the selection of spatial and temporal boundaries, selection of valued environmental components and trend assessment, selection of included projects and activities, identification of cumulative impacts on each VEC, assessment of impact significance and development of management actions.

Cumulative impacts were screened and assessed on four (4) VECs summarised below.

TABLE 1-18: SUMMARY OF RAPID CUMULATIVE IMPACT ASSESSMENT

VEC	Cumulative Impacts
Ambience noise	High
Aquatic ecology	Moderate
Terrestrial ecology	Moderate
Grazing land	Moderate

Across all VECs, the impact significance of the project on the VECs was assessed to be minor. However, the cumulative impact assessment score is driven to moderate and high levels by the impacts of existing and planned developments, pressures on the natural environmental and external social drivers.

In general, ambient noise levels in the region are expected to increase due to existing and upcoming developments such as the Alatau City project, which aims to develop infrastructure to support industries like finance, education, healthcare, and tourism. Furthermore, availability of traditionally open spaces used for grazing and pastureland will be negatively impacted as more development projects are initiated. These open spaces may be converted to other uses or fragmented, leading to obstruction of grazing routes, and cumulative barriers to movement which limits the usability of communal grazing lands.

Upcoming development of farms and waste disposal sites may increase food availability in the area which will likely attract scavengers, including raptor species. As a result, these raptor species may congregate in higher-than-usual densities within the landscape. With the ongoing expansion of infrastructure including transmission lines for the railway and solar power plant, the increased congregation of raptors may lead to significant risks of electrocution and collision of the species.

The Sorbulak Lake System, which supports globally threatened waterbirds such as the White-headed Duck and Dalmatian Pelican, faces increased risks due to heightened human activity and hunting pressures linked to surrounding developments. While the project’s direct impact is considered limited, these cumulative pressures could raise the overall impact to Minor to Moderate without effective mitigation measures like access control and enforcement of hunting regulations. For soaring raptors such as the Egyptian Vulture, Steppe Eagle, and Saker Falcon, the expansion of infrastructure and increased food availability from upcoming developments may lead to higher concentrations of birds, increasing the risk of collisions with power lines and electrocution. Although the project's direct impact on these raptors is Minor, the

cumulative impact could rise to Moderate due to the compounding effect of regional development and infrastructure growth. Recommended management actions for cumulative impacts include coordination at a regional and district level to plan for safe access to and availability of communal grazing lands to meet local needs and reduction of noise levels, joint waste management plans, insulation and perch management for transmission lines.

1.14 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

For all the impacts identified in the ESIA, appropriate mitigation, management, and monitoring measures have been proposed and included in the construction and operational Environmental and Social Management (ESMP). The purpose of the ESMP is to specify the standards and controls required to manage and monitor environmental and social impacts during construction and operational phases. The ESMP encompasses embedded controls and additional mitigation measures designed to minimise impacts, along with a comprehensive list of required management and monitoring plans. Regular monitoring and audits will be conducted throughout the Project lifecycle to ensure compliance with the ESMP. Further details are provided in the ESIA.

KTZ will oversee ESMP implementation across both construction and operation phases by establishing an Environmental and Social Management Unit (ESMU) in collaboration with the EPC contractor, Integra, Poligram, and other subcontractors. The detailed management framework, including implementation arrangements, training programs, budget, and schedule, is provided in the ESMP.

Standalone management plans have been developed to implement the mitigation measures identified in the ESIA and compiled in the ESMP. These include:

- Stakeholder Engagement Plan (SEP) with Grievance Redress Mechanism (GRM)
- Livelihood Restoration Plan (LRP) with Resettlement Framework (RF)
- Biodiversity Management Plan (BMP)
- Construction-stage Environmental and Social Management System (ESMS) which includes Contractor Management Procedures, Procurement and Supplier Management Plan, Stakeholder Engagement & Community Grievance Mechanism, Labour Management, Construction Camp & Workers' Accommodation, OHS Plan (including Emergency Preparedness and Response Plan), Community Health and Safety Management Plan, Pollution Prevention Plan, Waste Management Plan, Quarry Site Restoration Plan, Incident and Accident Handling Plan, Traffic (Transportation) Management Plan, Security Management Plan, Management of Change (MCP) Process, Monitoring and Reporting Mechanism, Training and Capacity Building and Tools and Checklists
- Cultural Heritage Management Framework (CHMF) which includes Cultural Heritage Site Screening, Chance Finds Procedure and Kurgan Archaeological Landscape Mitigation and Management Guideline
- Recommendations for the Operational-stage ESMS

1.15 GRIEVANCE MECHANISM

In addition to the existing grievance processes put in place through the Akimats (for land acquisition) and for KTZ employees, a Project-level Grievance Redress Mechanism (GRM) has

been proposed which provides a structured process for the affected stakeholders, including contractors, labourers and community members to raise their complaints and concerns. The grievances will be addressed promptly and transparently in a fair manner via appropriate grievance receiving channels. The Project GRM will be implemented by responsible parties who will disclose its details, document grievances, and follow up with appropriate actions. Long term monitoring and reporting will be conducted to determine broad trends and recurring problems so they can be resolved proactively before they become points of contention.

The Project GRM will be functional in addition to the existing government processes for grievances. The following grievance channels are available:

TABLE 1-19: GRIEVANCE CHANNELS

Channel	Description
KTZ Corporate GRM	
Toll free hotline	8-800-080-47-47
WhatsApp number	8-771-191-88-16
Email address managed by Samruk Kazyn (KTZ's parent company)	mail@sk-hotline.kz
Proposed Project-level GRM	
Grievance boxes at	Train stations: (Kazybek Bek, Sorbulak, Moyinkum, Zhana Arna, Zhetygen) Village level Akimats: Kazybek Bek and Zhetygen District / City Akimats: Iliy, Talgar, Karasay, Zhambyl, Alatau City Regional Akimat: Almaty Oblast Akimat
Community Liaison Officer (CLO) within the ESMU and LRIT	(On hold)
Email Address	(On hold)
WhatsApp / Telegram number	(On hold)
For escalation matters: KTZ Chief Grievance Officer	(On hold)
Existing labour-specific GRM to all KTZ projects	
Mobile application	KTZ HSE
Existing Kazakh GRM	
Government Citizen Portal	E-Otinish
Legal System	Applicable to citizens who raise grievances to the Court



ERM

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Belgium	New Zealand
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Denmark	Romania
France	Singapore
Germany	South Africa
Hong Kong	South Korea
India	Spain
Indonesia	Switzerland
Ireland	Taiwan
Italy	Thailand
Japan	UAE
Kazakhstan	UK
Kenya	US
Malaysia	Vietnam
Mexico	

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